

TABLE OF CONTENTS

Chapter 1	Purpose and Need for Action	1-1
1.1	Introduction	1-1
1.2	Purpose and Need	1-2
1.3	Related NEPA Documents	1-4
1.4	Public Participation	1-5
1.5	Coordination with Others	1-5
1.5.1	Federal.....	1-6
1.5.2	State	1-6
1.6	Project Area	1-6
Chapter 2	Alternatives Including the Proposed Action	2-1
2.1	NEPA Guidance for Alternatives	2-1
2.2	Background and History of Protection for Steller Sea Lions in these Groundfish Fisheries	2-1
2.2.1	Steller Sea Lion ESA Listing and Critical Habitat Designation	2-1
2.2.2	History of Steller Sea Lion Protection Measures	2-3
2.2.3	Development of Alternatives for this Analysis	2-4
2.3	Detailed Description of Alternatives	2-7
2.3.1	Alternative 1: No Action	2-8
2.3.2	Alternative 2: Low and Slow Approach	2-12
2.3.3	Alternative 3: Restricted and Closed Area Approach	2-20
2.3.4	Alternative 4: Area and Fishery Specific Approach (Preferred Alternative)	2-26
2.3.5	Alternative 5: Critical Habitat Catch Liit Approach	2-34
2.4	Alternatives Considered and Eliminated from Detailed Study	2-43
2.5	Description of the Current Fisheries	2-43
2.5.1	Overview of the Pollock, Pacific cod, and Atka mackerel Fisheries	2-47
2.5.1.1	The Directed Fishery for Pollock	2-49
2.5.1.2	The Directed Fishery for Pacific cod	2-51
2.5.1.3	The Directed Fishery for Atka mackerel	2-53
2.5.1.4	The CDQ Fishery	2-55
2.5.1.5	Incidental Catch of Pollock, Pacific cod and Atka mackerel in Other Directed Fisheries for Groundfish	2-60
2.5.2	Spatial and Temporal Fishing Patterns	2-67
2.5.3	Management Tools Used for Estimating Catch and Monitoring Location of Catch	2-85
2.5.4	Vessel Mishap History	2-87
Chapter 3	Affected Environment	3-1
3.1	Marine Mammals	3-1
3.1.1	Steller Sea Lion	3-1
3.1.1.2	Distribution	3-2
3.1.1.3	Population Status and Trends	3-2

3.1.1.3.1	Western Stock	3-2
3.1.1.3.2	Eastern Stock	3-3
3.1.1.4	Reproduction and Growth	3-4
3.1.1.5	Survival	3-7
3.1.1.6	Age distribution	3-7
3.1.1.7	Prey and Foraging Behavior	3-8
3.1.1.7.1	Methodology and potential biases	3-8
3.1.1.7.2	Foraging Distribution and Depths	3-9
3.1.1.7.3	Prey Species and Size	3-11
3.1.1.7.4	Prey Quality	3-13
3.1.1.7.5	Foraging - Integration and Synthesis	3-14
3.1.1.8	Physiology and Nutrition	3-15
3.1.1.9	Anthropogenic Sources of Mortality	3-18
3.1.1.10	Natural Predators	3-20
3.1.1.11	Disease and Contaminants	3-21
3.1.1.12	Natural Competitors	3-24
3.1.1.13	Influence of environmental and climatic change on Steller sea lions	3-24
3.1.2	Other ESA listed marine mammal species (Listed Great Whales)	3-36
3.1.2.1	Northern Right Whale	3-36
3.1.2.2	Bowhead Whale	3-37
3.1.2.3	Blue Whale	3-38
3.1.2.4	Fin Whale	3-39
3.1.2.5	Sei Whale	3-40
3.1.2.6	Humpback Whale	3-41
3.1.2.7	Sperm whale	3-43
3.1.3	Other Cetaceans Besides the ESA Listed Species	3-51
3.1.3.1	Gray Whale	3-51
3.1.3.2	Minke Whale	3-52
3.1.3.3	Beluga Whale	3-53
3.1.3.4	Killer Whale	3-55
3.1.3.5	Pacific White-Sided Dolphin	3-56
3.1.3.6	Harbor Porpoise	3-56
3.1.3.7	Dall's Porpoise	3-57
3.1.3.8	Beaked Whales	3-59
3.1.4	Northern Fur Seal	3-71
3.1.4.1	Prey and Foraging Behavior	3-71
3.1.4.2	Population Status and Trends	3-73
3.1.5	Harbor Seals	3-77
3.1.6	Other Pinnipeds	3-87
3.1.6.1	Spotted Seal	3-87
3.1.6.2	Bearded Seal	3-89
3.1.6.3	Ringed seal	3-90
3.1.6.4	Ribbon Seal	3-92
3.1.6.5	Northern Elephant Seal	3-93

	3.1.6.6 Family Odobenidae: Pacific Walrus	3-95
3.2	3.1.7 Sea Otters	3-95
	Principal Target Groundfish Fish Species	3-97
	3.2.1 Pollock	3-97
	3.2.2 Pacific Cod	3-107
	3.2.3 Atka Mackerel	3-110
	3.2.4 Flatfish	3-118
	3.2.5 Rockfish	3-119
	3.2.6 Thornyheads	3-120
	3.2.7 Sablefish	3-121
	3.2.8 Squid and Other Species	3-122
3.3	Non-specified Fish Species	3-123
3.4	Forage Fish	3-124
3.5	Status of Prohibited Species	3-120
	3.5.1 Pacific Salmon	3-122
	3.5.2 Pacific Halibut	3-127
	3.5.3 Pacific Herring	3-131
	3.5.4 BSAI Alaska King, Tanner, and Snow Crab	3-133
	3.5.5 GOA Alaska King and Tanner Crab	3-137
3.6	Endangered Species Act Listed Pacific Salmon	3-145
3.7	Seabirds	3-150
	3.7.1 ESA Listed Seabirds	3-150
	3.7.2 Other Seabirds	3-152
3.8	Effects of Fishing on Habitat, Including Essential Fish Habitat	3-154
	3.8.1 Habitat Areas of Particular Concern	3-154
	3.8.2 Effects on Habitat: Observations on Effects of Fishing Applicable to Alaska	3-156
	3.8.3 Trawling Patterns in Alaska Waters	3-161
	3.8.4 Effects of Other Gear Types	3-162
3.9	Ecosystem Issues	3-159
	3.9.1 Bering Sea and Aleutian Islands Ecosystem	3-161
	3.9.1 Gulf Of Alaska Ecosystems	3-163
3.10	State Managed Fisheries	3-171
	3.10.1 State Pacific Cod Fishery	3-173
	3.10.2 State Pollock Fishery	3-175
3.11	Management and Enforcement Issues	3-177
	3.11.1 Complexity of Area Boundaries	3-177
	3.11.2 Increasing Number and Complexity of Directed Fishing Closures	3-177
	3.11.3 Complexity of Quota Management	3-178
3.12	Social and Economic Parameters	3-181
	3.12.1 Existing Economic Conditions	3-181
	3.12.2 Existing Social Conditions	3-181
	3.12.2.1 Regions and Communities Involved in the North Pacific Groundfish Fishery	3-181
	3.12.2.2 Overview of the North Pacific Groundfish Fishery Socioeconomic Context	3-182

3.12.2.3	Alaska Peninsula and Aleutian Islands Region	3-190
3.12.2.4	Kodiak Island Region	3-196
3.12.2.5	Southcentral Alaska Region	3-202
3.12.2.6	Southeast Alaska Region	3-208
3.12.2.7	Washington Inland Waters Region	3-214
3.12.2.8	Oregon Coast Region	3-220
Chapter 4	Environmental Consequences	4-1
4.1	Effects on Marine Mammals	4-3
4.1.1	Effects on Steller Sea Lions	4-4
4.1.1.1	Effects of Alternative 1 on Steller Sea Lions	4-5
4.1.1.2	Effects of Alternative 2 on Steller Sea Lions	4-8
4.1.1.3	The effects of Alternative 3 on Steller Sea Lions	4-12
4.1.1.4	The effects of Alternative 4 on Steller Sea Lions	4-14
4.1.1.5	The Effects of Alternative 5 on Steller Sea Lions	4-16
4.1.1.6	Summary of Effects, Experimental Design Potential, and Re-initiation of Section 7 Consultation for Steller Sea Lions	4-19
4.1.2	Effects on Other ESA Listed Cetaceans (Listed Great Whales)	4-26
4.1.2.1	Effects of Alternative 1 on ESA Listed Cetaceans	4-29
4.1.2.2	Effects of Alternative 2 on ESA Listed Cetaceans	4-31
4.1.2.3	Effects of Alternative 3 on ESA Listed Cetaceans	4-32
4.1.2.4	Effects of Alternative 4 on ESA Listed Cetaceans	4-33
4.1.2.5	Effects of Alternative 5 on ESA Listed Cetaceans	4-33
4.1.2.6	Summary of Effects and Re-initiation of Section 7 Consultation on ESA Listed Cetaceans	4-34
4.1.3	Effects on Other Cetaceans Besides ESA Listed Species	4-36
4.1.3.1	Effects of Alternative 1 on Other Cetaceans Besides ESA Listed Species	4-39
4.1.3.2	Effects of Alternative 2 on Other Cetaceans Besides ESA Listed Species	4-40
4.1.3.3	Effects of Alternative 3 on Other Cetaceans Besides ESA Listed Species	4-41
4.1.3.4	Effects of Alternative 4 on Other Cetaceans Besides ESA Listed Species	4-42
4.1.3.5	Effects of Alternative 5 on Other Cetaceans Besides ESA Listed Species	4-43
4.1.3.6	Summary of Effects on Other Cetaceans Besides ESA Listed Species	4-44
4.1.4	Effects of the Alternatives on Northern Fur Seals	4-44
4.1.4.1	Effects of Alternative 1 on Northern Fur Seals	4-45
4.1.4.2	Effects of Alternative 2 on Northern Fur Seals	4-48
4.1.4.3	Effects of Alternative 3 on Northern Fur Seals	4-50
4.1.4.4	Effects of Alternative 4 on Northern Fur Seals	4-51
4.1.4.5	Effects of Alternative 5 on Northern Fur Seals	4-52
4.1.4.6	Summary of Effects on Northern Fur Seals	4-54
4.1.5	Effects on Harbor Seals	4-59

4.1.5.1	Effects on Alternative 1 on Harbor Seals	4-59
4.1.5.2	Effects of Alternative 2 on Harbor Seals	4-60
4.1.5.3	Effects of Alternative 3 on Harbor Seals	4-60
4.1.5.4	Effects of Alternative 4 on Harbor Seals	4-61
4.1.5.5	Effects of Alternative 5 on Harbor Seals	4-63
4.1.5.6	Summary of Effects on Harbor Seals	4-63
4.1.6	Effects of the Alternatives on Other Pinnipeds	4-65
4.1.6.1	Effects of Alternative 1 on Other Pinnipeds	4-66
4.1.6.2	Effects of Alternative 2 on Other Pinnipeds	4-68
4.1.6.3	Effects of Alternative 3 on Other Pinnipeds	4-69
4.1.6.4	Effects of Alternative 4 on Other Pinnipeds	4-70
4.1.6.5	Effects of Alternative 5 on Other Pinnipeds	4-71
4.1.6.6	Summary of Effects on Other Pinnipeds	4-72
4.1.7	Effects on Sea Otters	4-73
4.1.7.1	Effects of Alternative 1 on Sea Otters	4-73
4.1.7.2	Effects of Alternative 2 on Sea Otters	4-75
4.1.7.3	Effects of Alternative 3 on Sea Otters	4-76
4.1.7.4	Effects of Alternative 4 on Sea Otters	4-76
4.1.7.5	Effects of Alternative 5 on Sea Otters	4-77
4.1.7.6	Summary of Effects on Sea Otters	4-78
4.2	Effects on Target Commercial Fisheries	4-93
4.2.1	Methods used for population projections under the alternatives	4-93
4.2.1.1	Age-structured stocks	4-94
4.2.1.2	Management Model	4-94
4.2.1.3	Alternative specific details	4-94
4.2.1.4	Critical assumptions	4-95
4.2.1.5	Projection model details	4-96
4.2.1.6	The Linear programming algorithm	4-99
4.2.1.7	Objective function coefficients	4-99
4.2.1.8	Linear Constraints	4-100
4.2.1.9	Methods used to estimate the 1997-99 bycatch arrays	4-102
4.2.2	Effects of the Alternatives on Walleye Pollock	4-105
4.2.2.1	Effects of Alternative 1 on Walleye Pollock	4-108
4.2.2.2	Effects of Alternative 2 on Walleye Pollock	4-109
4.2.2.3	Effects of Alternative 3 on Walleye Pollock	4-111
4.2.2.4	Effects of Alternative 4 on Walleye Pollock	4-113
4.2.2.5	Effects of Alternative 5 on Walleye Pollock	4-114
4.2.2.6	Summary of Effects on Walleye Pollock	4-116
4.2.3	Effects of the Alternatives on Pacific cod	4-121
4.2.3.1	Effects of Alternative 1 on Pacific cod	4-125
4.2.3.2	Effects of Alternative 2 on Pacific cod	4-127
4.2.3.3	Effects of Alternative 3 on Pacific cod	4-129
4.2.3.4	Effects of Alternative 4 on Pacific cod	4-131
4.2.3.5	Effects of Alternative 5 on Pacific cod	4-134
4.2.3.6	Summary of Effects on Pacific cod	4-136
4.2.4	Effects of the Alternatives on Atka mackerel	4-137

4.2.4.2	Effects of Alternative 2 on Atka mackerel	4-141
4.2.4.3	Effects of Alternative 3 on Atka mackerel	4-143
4.2.4.4	Effects of Alternative 4 on Atka mackerel	4-144
4.2.4.5	Effects of Alternative 5 on Atka mackerel	4-146
4.2.4.6	Summary of Effects on Atka mackerel	4-148
4.2.5	Effects of the Alternatives on Other Target Species	4-149
4.2.5.1	Flatfish Species	4-149
4.2.5.1.1	Effects of Alternative 1 on Flatfish Species	4-151
4.2.5.1.2	Effects of Alternative 2 on Flatfish Species	4-152
4.2.5.1.3	Effects of Alternative 3 on Flatfish Species	4-152
4.2.5.1.4	Effects of Alternative 4 on Flatfish Species	4-153
4.2.5.1.5	Effects of Alternative 5 on Flatfish Species	4-153
4.2.5.1.6	Summary of Effects on Flatfish Species	4-153
4.2.5.2	Bering Sea/Aleutian Islands Rockfish	4-155
4.2.5.2.1	Effects of Alternative 1 on Bering Sea/Aleutian Islands Rockfish	4-158
4.2.5.2.2	Effects of Alternative 2 on Bering Sea/Aleutian Islands Rockfish	4-159
4.2.5.2.3	Effects of Alternative 3 on Bering Sea/Aleutian Islands Rockfish	4-159
4.2.5.2.4	Effects of Alternative 4 on Bering Sea/Aleutian Islands Rockfish	4-160
4.2.5.2.5	Effects of Alternative 4 on Bering Sea/Aleutian Islands Rockfish	4-160
4.2.5.2.6	Summary of Effects on Bering Sea/Aleutian Islands Rockfish	4-160
4.2.5.3	Gulf of Alaska Rockfish	4-162
4.2.5.3.1	Effects of Alternatives 1 through 5 on Gulf of Alaska Rockfish	4-162
4.2.5.3.2	Summary of Effects on Gulf of Alaska Rockfish	4-163
4.2.5.4	Effects on Gulf of Alaska Thornyheads	4-164
4.2.5.4.1	Effects of Alternative 1 on Gulf of Alaska Thornyheads	4-166
4.2.5.4.2	Effects of Alternative 2 on Gulf of Alaska Thornyheads	4-167
4.2.5.4.3	Effects of Alternative 3 on Gulf of Alaska Thornyheads	4-168
4.2.5.4.4	Effects of Alternative 4 on Gulf of Alaska Thornyheads	4-168
4.2.5.4.5	Effects of Alternative 5 on Gulf of Alaska Thornyheads	4-169
4.2.5.3.6	Summary of Effects on Thornyheads	4-169
4.2.5.5	Sablefish	4-170
4.2.5.5.1	Effects of Alternatives 1 through 5 on Sablefish	4-172
4.2.5.5.2	Summary of Effects on Sablefish	4-173
4.2.5.6	Other Species	4-174
4.2.5.6.1	BSAI Squid and Other Species	4-174
4.2.5.6.1.1	Effects of Alternatives 1 through 5 on BSAI Squid and Other Species	4-174
4.2.5.6.1.1.1	Summary of Effects on BSAI Squid and Other Species	4-176

4.2.5.6.2	Gulf of Alaska Other Species	4-177
4.2.5.6.2.1	Effects of Alternatives 1 through 5 on Gulf of Alaska Other Species	4-177
4.2.5.6.2.1	Summary of Effects on Gulf of Alaska and Other Species	4-178
4.3	Effects on Incidental Catch of Non-Specified Species	4-180
4.3.1	Effects on Non-specified Species in the BSAI	4-180
4.3.1.1	Effects of Alternative 1 on Non-specified Species in the BSAI	4-180
4.3.1.2	Effects of Alternative 2 on Non-specified Species in the BSAI	4-181
4.3.1.3	Effects of Alternative 3 on Non-specified Species in the BSAI	4-181
4.3.1.4	Effects of Alternative 4 on Non-specified Species in the BSAI	4-181
4.3.1.5	Effects of Alternative 5 on Non-specified Species in the BSAI	4-181
4.3.1.6	Summary of Effects on Non-specified Species in the BSAI	4-182
4.3.2	Effects on Non-specified Species in the GOA	4-183
4.3.2.1	Effects of Alternative 1 on Non-specified Species in the GOA	4-183
4.3.2.2	Effects of Alternative 2 on Non-specified Species in the GOA	4-183
4.3.2.3	Effects of Alternative 3 on Non-specified Species in the GOA	4-184
4.3.2.4	Effects of Alternative 4 on Non-specified Species in the GOA	4-184
4.3.2.5	Effects of Alternative 1 on Non-specified Species in the GOA	4-184
4.3.2.6	Summary of Effects on Non-specified Species in the GOA	4-184
4.4	Effects on Forage Fish Species	4-185
4.4.1	Effects of Alternative 1 on Forage Fish Species	4-186
4.4.2	Effects of Alternative 2 on Forage Fish Species	4-186
4.4.3	Effects of Alternative 3 on Forage Fish Species	4-186
4.4.4	Effects of Alternative 4 on Forage Fish Species	4-187
4.4.5	Effects of Alternative 5 on Forage Fish Species	4-187
4.4.6	Summary of Effects of Alternative 1 on Forage Fish Species	4-187
4.5	Effects on Prohibited Species Bycatch	4-188
4.5.1	Bering Sea and Aleutian Islands Area	4-189
4.5.1.1	Effects of Alternative 1 on Prohibited Species Bycatch in the BSAI	4-191
4.5.1.2	Effects of Alternative 2 on Prohibited Species Bycatch in the BSAI	4-192
4.5.1.3	Effects of Alternative 3 on Prohibited Species Bycatch in the BSAI	4-193
4.5.1.4	Effects of Alternative 4 on Prohibited Species Bycatch in the BSAI	4-193
4.5.1.5	Effects of Alternative 5 on Prohibited Species Bycatch in the BSAI	4-194
4.5.1.6	Summary of Effects on Prohibited Species Bycatch in the BSAI	4-194
4.5.2	Gulf of Alaska	4-198
4.5.2.1	Effects of Alternative 1 on Prohibited Species Bycatch in the GOA	4-198
4.5.2.2	Effects of Alternative 21 on Prohibited Species Bycatch in the GOA	4-199

4.5.2.3	Effects of Alternative 3 on Prohibited Species Bycatch in the GOA	4-199
4.5.2.4	Effects of Alternative 4 on Prohibited Species Bycatch in the GOA	4-199
4.5.2.5	Effects of Alternative 5 on Prohibited Species Bycatch in the GOA	4-200
4.5.2.6	Summary of Effects on Prohibited Species Bycatch in the GOA	4-200
4.6	Effects on Endangered Species Act Listed Pacific Salmon	4-202
4.6.1	Effects of Alternative 1 on ESA Listed Pacific Salmon	4-203
4.6.2	Effects of Alternative 2 on ESA Listed Pacific Salmon	4-205
4.6.3	Effects of Alternative 3 on ESA Listed Pacific Salmon	4-205
4.6.4	Effects of Alternative 4 on ESA Listed Pacific Salmon	4-206
4.6.5	Effects of Alternative 5 on ESA Listed Pacific Salmon	4-206
4.6.6	Summary of the Effects and Re-initiation of Section 7 Consultation on ESA Listed Pacific Salmon	4-209
4.7	Effects of the Alternatives on Seabirds	4-210
4.7.1	Effects of Alternative 1 on Seabirds	4-215
4.7.2	Effects of Alternative 2 on Seabirds	4-221
4.7.3	Effects of Alternative 3 on Seabirds	4-223
4.7.4	Effects of Alternative 4 on Seabirds	4-224
4.7.5	Effects of Alternative 5 on Seabirds	4-226
	4.7.6 Summary of the Effects of the Alternatives on Seabirds and Re-initiation of Section 7 Consultation on ESA Listed Seabirds	4-227
4.8	Effects of the Alternatives on Marine Benthic Habitat	4-237
4.8.1	Effects of Alternative 1 on Marine Benthic Habitat	4-241
4.8.2	Effects of Alternative 2 on Marine Benthic Habitat	4-241
4.8.3	Effects of Alternative 3 on Marine Benthic Habitat	4-242
4.8.4	Effects of Alternative 4 on Marine Benthic Habitat	4-243
4.8.5	Effects of Alternative 5 on Marine Benthic Habitat	4-244
4.8.6	Summary of Effects on Marine Benthic Habitat and EFH Determination	4-244
4.9	Effects of the Alternatives on the Ecosystem	4-251
4.9.1	Effects of Alternative 1 on the Ecosystem	4-256
4.9.2	Effects of Alternative 2 on the Ecosystem	4-257
4.9.3	Effects of Alternative 3 on the Ecosystem	4-259
4.9.4	Effects of Alternative 4 on the Ecosystem	4-259
4.9.5	Effects of Alternative 5 on the Ecosystem	4-259
4.9.6	Summary of Effects of the Alternatives on the Ecosystem	4-259
4.10	Effects on State of Alaska Managed Fisheries	4-263
4.10.1	State Pacific cod fishery	4-263
4.10.1.1	Alternative 1	4-263
4.10.1.2	Alternative	4-263
4.10.1.3	Alternative 3	4-264
4.10.1.4	Alternative	4-264
4.10.1.5	Alternative 5	4-264

4.10.1.6	Summary of effects and significance ratings	4-264
4.10.2	State pollock fishery in Prince William Sound	4-265
4.10.2.1	Alternative 1	4-265
4.10.2.2	Alternative 2	4-265
4.10.2.3	Alternative	4-265
4.10.2.4	Alternative 4	4-266
4.10.2.5	Alternative 5	4-266
4.10.2.6	Summary of effects and significance ratings	4-266
4.11	Management and Enforcement	4-267
4.11.1	Monitoring and Enforcing Area Closures	4-267
4.11.2	Groundfish Quota Management	4-269
4.11.3	Vessel Monitoring System Requirements	4-278
4.11.3.1	Background	4-278
4.11.3.2	Vessel Monitoring System	4-279
4.11.3.3	Applicability of VMS to Steller Sea Lion Protection Measures	4-280
4.11.3.4	VMS Operation Requirement	4-281
4.11.3.5	Fleet Summary	4-282
4.11.3.6	Cost of VMS	4-287
4.11.3.7	Alternatives to VMS for Vessel Tracking	4-288
4.11.4	Effects of the American Fisheries Act on Steller Sea Lion Protection	4-289
4.11.5	Significance Rating of the Alternatives' Impact on Management and Enforcement	4-293
4.12	Social and Economic Consequences	4-295
4.12.1	Fishing Industry Sectors and Consumer Values	4-296
4.12.1.1	Existence Values	4-296
4.12.1.2	Non-Market Subsistence Use	4-296
4.12.1.3	Non-Consumptive Eco-tourism Use	4-297
4.12.1.4	Harvests and Fish Prices	4-297
4.12.1.5	Operating Cost Impacts	4-298
4.12.1.6	Groundfish Product Values	4-299
4.12.1.7	Safety Impacts	4-300
4.12.1.8	Impacts to Related Fisheries	4-300
4.12.1.9	Costs to Consumers	4-300
4.12.1.10	Management and Enforcement	4-301
4.12.1.11	Excess Capacity	4-301
4.12.1.12	Prohibited Fish Catch and Discards	4-302
4.12.2	Social Impacts Assessment	4-304
4.12.2.1	Overview	4-305
4.12.2.1.1	High and Low Estimates	4-305
4.12.2.1.2	Methodology	4-305
4.12.2.2	Effects Analysis, by Region and Alternative	4-306
4.12.2.2.1	Alaska Peninsula/Aleutian Islands Region	4-306
4.12.2.2.2	Kodiak Region	4-309
4.12.2.2.3	Alaska Southcentral Region	4-311
4.12.2.2.4	Alaska Southeast Region	4-313
4.12.2.2.5	Washington Inland Waters Region	4-315

4.12.2.2.6	Oregon Coast Region	4-318
4.13	Cumulative Effects	4-369
4.13.1	Methodology and External Factors	4-369
4.13.2	Marine Mammals	4-373
4.13.2.1	Introduction	4-373
4.13.2.2	Steller Sea Lions	4-375
4.13.2.3	Great Whales (ESA Listed)	4-387
4.13.2.4	Other Cetaceans	4-390
4.13.2.5	Northern Fur Seal	4-393
4.13.2.6	Harbor Seal	4-407
4.13.2.7	Other Pinniped	4-414
4.13.2.8	Sea otters	4-417
4.13.3	Target Groundfish Species and Other Species	4-420
4.13.3.1	Introduction	4-420
4.13.3.2	Walleye Pollock	4-421
4.13.3.3	Pacific Cod	4-426
4.13.3.4	Atka Mackerel	4-431
4.13.3.4.1	Past Internal and External Effects	4-431
4.13.3.4.2	Alternatives 1 through 5	4-431
4.13.3.5	Flatfish	4-435
4.13.3.5.1	Past Effects	4-435
4.13.3.5.2	Alternatives 1 through 5	4-436
4.13.3.6	Rockfish	4-440
4.13.3.6.1	Past Effects	4-440
4.13.3.6.2	Alternatives 1 through 5	4-441
4.13.3.7	Thornyheads	4-446
4.13.3.7.1	Past External Effects	4-446
4.13.3.7.2	Alternatives 1 through 5	4-446
4.13.3.8	Sablefish	4-449
4.13.3.8.1	Past Effects	4-449
4.13.3.8.2	Alternatives 1 through 5	4-449
4.13.3.9	Squid and Other Species	4-452
4.13.4	Non-Specified Fish Species	4-452
4.13.5	Forage Fish	4-453
4.13.6	Prohibited Species	4-453
4.13.6.1	Introduction	4-453
4.13.6.2	Pacific Halibut	4-454
4.13.6.3	Crab Species	4-456
4.13.6.4	Pacific Herring	4-465
4.13.6.5	Salmon	4-469
4.13.7	ESA Listed Pacific Salmon	4-476
4.13.8	Seabirds	4-477
4.13.9	Benthic Habitat and Essential Fish Habitat	4-487
4.13.9.1	Introduction	4-487
4.13.9.2	Past Internal and External Effects	4-488
4.13.9.3	Present and Predicted External Effects	4-489

4.13.9.4	Alternatives 1 and 5 - Cumulative Effects	4-489
4.13.9.5	Alternative 2	4-489
4.13.9.6	Alternative 3	4-490
4.13.9.7	Alternative 4	4-490
4.13.10	Ecosystem	4-497
4.13.10.1	Introduction	4-497
4.13.10.2	Predator-Prey Relationships	4-498
4.13.10.3	Energy Flow and Balance	4-504
4.13.10.4	Biological Diversity	4-507
4.13.11	State-managed Fisheries	4-512
4.13.12	Management and Enforcement	4-512
4.13.13	Socioeconomic Cumulative Effects	4-512
4.13.13.1	Introduction	4-513
4.13.13.2	Fishing Industry Sectors and Consumer Values	4-514
4.13.13.3	Regions and Communities	4-534
4.14	Special Considerations Regarding Impacts of Options 1-3 under Alternative 4	4-550
Chapter 5	List of Preparers	5-1
5.1	SEIS Steering Committee	5-1
5.2	Project Leaders	5-1
5.3	Contributors	5-1
5.4	Consultant Contributors	5-7
Chapter 6	List of Agencies, Organizations, and Persons to Whom Copies of the Statement are sent	6-1
Chapter 7	Literature Cited	7-1
Appendix A	Endangered Species Act - Section 7 Consultation DRAFT Biological Opinion and Incidental Take Statement	
Appendix B	Scoping Process	
Appendix C	Regulatory Impact Review	
Appendix D	Market Analysis of Alaska Groundfish Fisheries: Alaska Pollock, Pacific cod, and Atka Mackerel	
Appendix E	Harvest Data and Maps	
Appendix F	Social Impact Assessment	

LIST OF TABLES

Table 2.3-1	Comparison of management measures under the alternatives.	2-40
Table 2.5-1	Regulatory allocations of 2001 TAC specifications in the BSAI.	2-48
Table 2.5-2	Regulatory allocations of 2001 TAC specifications in the GOA.	2-49
Table 2.5-3	2001 Eastern Bering Sea Pollock Seasonal Allocations based on 1.4 million mt TAC.	2-51
Table 2.5-4	Atka mackerel - Aleutians Islands area 2001 seasonal allocations based on 69,300 mt TAC.	2-54
Table 2.5-5	Eligible Western Alaska Communities and the CDQ Groups.	2-57
Table 2.5-6	Multispecies CDQ Program Allocations in 2001.	2-58
Table 2.5-7	1999 catch of non CDQ pollock by area, fishery, and gear in descending order based on catch.	2-62
Table 2.5-8	1999 catch of non CDQ Pacific cod by area, fishery, and gear in descending order based on catch.	2-64
Table 2.5-9	1999 catch of non CDQ Atka mackerel by area, fishery, and gear in descending order based on catch.	2-66
Table 2.5-10	Metric tons of pollock taken in fisheries where pollock was the target, Pacific cod where Pacific cod was the target, and Atka mackerel where Atka mackerel was the target. [Percentages reflect estimated 1999 catch within specified distances of haulouts or rookeries relative to total catch amounts derived from Appendix E-2.]	2-69
Table 2.5-11	Metric tons of pollock taken in fisheries where pollock was the target, Pacific cod where Pacific cod was the target, and Atka mackerel where Atka mackerel was the target. [Percentages reflect estimated 1999 catch within Alaska State waters (i.e., within 3 nm of the shore) relative to total catch amounts derived from Appendix E-2.]	2-77
Table 3.6-1	Summary of Salmonid species listed and proposed for listing under the Endangered Species Act. Evolutionarily significant units (in bold italic) represent those likely to range into marine waters off Alaska.	3-147
Table 3.6-2	Estimated numbers of chinook salmon taken by groundfish fisheries in the BSAI and GOA from 1990 - 2000.	3-148
Table 3.6-3	Coded wire tag recoveries of listed salmon species surrogate stocks from 1984 -1999 in the GOA and BSAI groundfish fisheries.	3-149
Table 3.9-1	Recommended measures to achieve an ecosystem-based management approach	3-160
Table 3.10-1	State and Federal managed groundfish harvest in the GOA in 2000	3-173
Table 3.10-2	State Pacific cod fisheries harvest in 2000	3-175
Table 3.12-1	Study regions and their acronyms	3-181
Table 3.12-2	Selected North Pacific groundfish participation measures by region, 1999	3-187
Table 3.12-3	Groundfish harvests delivered to inshore plants by species, 1999	3-188
Table 3.12-4	Groundfish wholesale value of regionally owned processors by processor class, 1999	3-188
Table 3.12-5	Groundfish retained harvest by catcher vessels owned by residents of various regions by FMP subarea, 1999	3-188

Table 3.12-6	Number of boats and retained catch by weight and value, by species group, by catcher vessel ownership, and by region, 1999	3-189
Table 3.12-7	Retained harvests by FMP area and species of regional catcher vessels, 1999	3-190
Table 3.12-8	North Pacific groundfish fishery participation measures for Alaska Peninsula/Aleutian Islands region, 1992-2000	3-193
Table 3.12-9	Groundfish reported by Alaska Peninsula/Aleutian Islands region inshore plants by species group	3-193
Table 3.12-10	Groundfish wholesale value of processor class owned by residents of the Alaska Peninsula/Aleutian Islands region, 1992-2000	3-194
Table 3.12-11	Groundfish retained harvest ex-vessel value, catcher vessels owned by Alaska Peninsula/Aleutian Islands region residents by FMP subarea, 1999-2000	3-194
Table 3.12-12	Number of boats and retained catch by weight and value, by species group, and by catcher vessel ownership for the Alaska Peninsula/Aleutian Islands region	3-195
Table 3.12-13	Retained harvests by FMP area and species of Alaska Peninsula/Aleutian Islands region catcher vessels	3-196
Table 3.12-14	North Pacific groundfish fishery participation measures for Kodiak region, 1992-2000	3-199
Table 3.12-15	Groundfish reported by Kodiak region inshore plants by species group	3-200
Table 3.12-16	Groundfish wholesale value of processor class owned by residents of the Kodiak region, 1992-2000	3-200
Table 3.12-17	Groundfish retained harvest ex-vessel value, catcher vessels owned by Kodiak region residents by FMP subarea, 1999-2000	3-200
Table 3.12-18	Number of boats and retained catch by weight and value, by species group, and by catcher vessel ownership for the Kodiak region	3-201
Table 3.12-19	Retained harvests by FMP area and species of Kodiak regional catcher vessels	3-202
Table 3.12-20	North Pacific Groundfish Fishery Participation Measures for the Southcentral Alaska Region, 1992-2000	3-205
Table 3.12-21	Groundfish reported by Southcentral Alaska region inshore plants by species group	3-205
Table 3.12-22	Groundfish wholesale value of processor class owned by residents of the Southcentral Alaska region, 1992-2000	3-206
Table 3.12-23	Groundfish retained harvest ex-vessel value, catcher vessels owned by Southcentral Alaska region residents by FMP subarea, 1999-2000	3-206
Table 3.12-24	Number of boats and retained catch by weight and value, by species group, and by catcher vessel ownership for the Southcentral Alaska region	3-207
Table 3.12-25	Retained harvests by FMP area and species of Southcentral Alaska regional catcher vessels	3-208
Table 3.12-26	North Pacific groundfish fishery participation measures for Southeast Alaska region, 1992-2000	3-211
Table 3.12-27	Groundfish reported by Southeast Alaska region inshore plants by species group	3-211
Table 3.12-28	Groundfish wholesale value of processor class owned by residents of the Southeast Alaska region, 1992-2000	3-212
Table 3.12-29	Groundfish retained harvest ex-vessel value, catcher vessels owned by Southeast Alaska region residents by FMP subarea, 1999-2000	3-212
Table 3.12-30	Number of boats and retained catch by weight and value, by species group,	

and by catcher vessel ownership for the Southeast Alaska region	3-213
Table 3.12.-31 Retained harvests by FMP area and species of Southeast Alaska regional catcher vessels	3-214
Table 3.12.-32 North Pacific Groundfish fishery participation measures for Washington inland waters regions 1992-2000	3-217
Table 3.12-33 Groundfish reported by Washington inland waters region inshore plants by species group	3-217
Table 3.12-34 Groundfish wholesale value of processor class owned by residents of the Washington inland waters region, 1992-2000	3-218
Table 3.12-35 Groundfish retained harvest ex-vessel value, catcher vessels owned by Washington inland waters region residents by FMP subarea, 1999-2000	3-218
Table 3.12-36 Number of boats and retained catch by weight and value, by species group, and by catcher vessel ownership for the Washington inland waters region	3-219
Table 3.12-37 Retained harvests by FMP area and species of Washington inland wasters regional catcher vessels	3-220
Table 3.12-38 North Pacific groundfish fishery participation measures for Oregon Coast region, 1992-2000	3-222
Table 3.12-39 Groundfish reported by Oregon Coast region inshore plants by species group	3-222
Table 3.12-40 Groundfish wholesale value of processor class owned by residents of the Oregon Coast region, 1992-2000	3-223
Table 3.12-41 Groundfish wholesale value of processor class owned by residents of the Oregon Coast region, 1992-2000	3-223
Table 3.12-42 Number of boats and retained catch by weight and value, by species group, and by catcher vessel ownership for the Oregon Coast region	3-224
Table 3.12-43 Retained harvests by FMP area and species of Oregon Coast regional catcher vessels	3-225
Table 4.0-1 Reference points for significance determinations	4-3
Table 4.1-1 Criteria for determining significance of effects to pinnipeds and sea otters.	4-21
Table 4.1-2 Estimated incidental take of Steller sea lions and other marine mammals by commercial pollock, Pacific cod, and Atka mackerel fisheries under each alternative	4-22
Table 4.1-3 Projected total annual catch (TAC) for Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska pollock, Pacific cod, and Atka mackerel by fishery area.	4-23
Table 4.1-4 Intensity of effects categories (harvest of prey species and spatial/temporal concentration) and associated percent increase to population, and new population trends for Steller sea lions.	4-25
Table 4.1-5 Summary of effects of Alternatives 1 through 5 on Steller sea lion.	4-26
Table 4.1-6 Criteria for determining significance of effects to cetaceans.	4-34
Table 4.1-7 Summary of effects of Alternatives 1 through 5 on ESA listed cetaceans.	4-35
Table 4.1-8 Summary of effects of Alternatives 1 through 5 on other cetaceans besides the ESA listed species.	4-44
Table 4.1-9 Summary of effects of Alternatives 1 through 5 on northern fur seals.	4-54
Table 4.1-10 Summary of effects of Alternatives 1 through 5 on harbor seals.	4-64
Table 4.1-11 Summary of effects of Alternatives 1 through 5 on other pinnipeds.	4-73
Table 4.1-12 Summary of effects of Alternatives 1 through 5 on sea otters.	4-78

Table 4.2-1	Eastern Bering Sea walleye pollock. Five year population model projections of catch, ABC (Acceptable Biological Catch), spawning biomass, and total biomass under each alternative	4-105
Table 4.2-2	Gulf of Alaska walleye pollock. Five year population model projections of catch, ABC (Acceptable Biological Catch), spawning biomass, and total biomass under each alternative	4-106
Table 4.2-3	Criteria used to estimate the significance of effects on targeted groundfish stocks in the Bering Sea, Aleutian Islands, and Gulf of Alaska by Alternatives 1 through 5	4-117
Table 4.2-5	Summary of effects of Alternatives 1 through 5 on pollock in the Gulf of Alaska.	4-121
Table 4.2-6	Alternatives yielding lowest and highest values and ratio for variables in the Bering Sea and Aleutians Islands, and the Gulf of Alaska	4-122
Table 4.2-7	Eastern Bering Sea Pacific cod. Five year population model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under each alternative.	4-123
Table 4.2-8	Gulf of Alaska Pacific Cod. Five year population model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under each alternative..	4-124
Table 4.2-9	Summary of effects of Alternatives 1 through 5 on Pacific cod in the eastern Bering Sea	4-136
Table 4.2-10	Summary of effects of Alternatives 1 through 5 on Pacific cod in the Gulf of Alaska.	4-137
Table 4.2-11	Bering Sea/Aleutian Islands Atka mackerel. Five year population model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under each alternative in 1000s of mt	4-138
Table 4.2-12	Gulf of Alaska Atka mackerel. Five year population model projections of average catch, and ABC (Acceptable Biological Catch)	4-138
Table 4.2-13	Summary of effects of Alternatives 1 through 5 on BSAI Atka mackerel.	4-148
Table 4.2-14	Summary of effects of Alternatives 1 through 5 on Atka mackerel in the Gulf of Alaska	4-149
Table 4.2-15	Eastern Bering Sea flatfish. Five year population model projections of average catch, ABC (acceptable biological catch), female spawning biomass and total biomass under each alternative	4-150
Table 4.2-16	Gulf of Alaska flatfish. Five year population model projections of average catch and ABC (acceptable biological catch) under each Alternative	4-151
Table 4.2-17	Summary of effects of Alternatives 1 through 5 on flatfish target species in the BSAI and GOA.	4-154
Table 4.2-18	Bering Sea/Aleutian Islands Pacific Ocean Perch. Five-year populations model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under Alternatives 1 through 5	4-156
Table 4.2-19	Average age, average F, $F_{40\%}$, and equilibrium catch at $F_{40\%}$ for the Aleutian Islands and eastern Bering Sea portions of the Pacific Ocean Perch under Alternatives 1 through 5	4-157
Table 4.2-20	Projected catch and Acceptable Biological Catch of Bering Sea/Aleutian Islands other red rockfish under Alternatives 1 through 5	4-157

Table 4.2-21	Projected catch and Acceptable Biological Catch of Bering Sea/Aleutian Islands other rockfish under Alternatives 1 through 5	4-158
Table 4.2-22	Summary of effects of Alternatives 1 through 5 on BSAI Pacific Ocean perch.	4-161
Table 4.2-23	Summary of effects of Alternatives 1 through 5 on other red and other rockfish target species in the BSAI.	4-162
Table 4.2-24	Summary of effects of Alternatives 1 through 5 on Gulf of Alaska rockfish.	4-164
Table 4.2-25	Gulf of Alaska thornyheads. Five year population model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under each alternative, in units of thousands of metric tons	4-165
Table 4.2-26	Summary of effects of Alternatives 1 through 5 on GOA thornyheads.	4-170
Table 4.2-27	Gulf of Alaska, Bering Sea, and Aleutian Island sablefish. Five-year populations model projections of average catch, ABC (Acceptable Biological Catch), average spawning biomass, and total biomass under Alternatives 1 through 5	4-171
Table 4.2-28	GOA and BSAI Sablefish. Biological reference points ($B_{35\%}$, $B_{40\%}$, $F_{40\%}$) and estimated average age of the population under different fishing mortality rates	4-172
Table 4.2-29	Summary of effects of Alternatives 1 through 5 on BSAI and GOA sablefish.	4-173
Table 4.2-30	Summary of effects Alternatives 1 through 5 on squid and other species in the BSAI.	4-176
Table 4.2-31	Summary of effects of Alternatives 1 through 5 on other species in the GOA.	4-179
Table 4.3-1	Criteria used to describe significance of impacts on incidental catch of non-specified species in both the BSAI and GOA.	4-182
Table 4.3-2	Summary of effects of Alternatives 1 through 5 on non-specified species in the BSAI.	4-183
Table 4.3-3	Summary of effects of Alternatives 1 through 5 on non-specified species in the GOA	4-185
Table 4.4-1	Criteria used to describe significance of impacts on incidental catch of forage fish species	4-188
Table 4.4-2	Summary of effects on forage fish species in the BSAI and GOA.	4-188
Table 4.5-1	The estimated change in bycatch levels in the BSAI when compared to the average estimated from 1997 and 1999	4-191
Table 4.5-2	Criteria used to describe significance of impacts on prohibited species bycatch	4-196
Table 4.5-3	Summary of effects of Alternatives 1 through 5 on prohibited species bycatch (pollock and Pacific cod) in the Bering Sea	4-197
Table 4.5-4	Summary of effects of Alternatives 1 through 5 on prohibited species bycatch (Atka mackerel) in the Aleutian Islands.	4-197
Table 4.5-5	The estimated change in bycatch levels in the GOA when compared to the average estimated from 1997 and 1999.	4-198
Table 4.5-6	Criteria used to describe significance of impacts on prohibited species bycatch	4-201
Table 4.5-7	Significance of impacts of the alternatives on prohibited species bycatch in the GOA.	4-202
Table 4.6-1	Criteria used to describe significance of impacts on ESA listed Pacific salmon.	4-207
Table 4.6-2	Summary of impacts of the alternatives on ESA listed Pacific salmon.	4-207

Table 4.6-3	Percent difference in selected bycatch as compared to baseline catch for Bering Sea and Aleutian Islands Region pollock fishery.	4-208
Table 4.6-4	Percent difference in selected bycatch as compared to baseline catch for Gulf of Alaska Region pollock fishery	4-208
Table 4.7-1	Preliminary estimated total incidental catch of seabirds by species or species groups in Bering Sea and Aleutian Islands and Gulf of Alaska longline fisheries, 1993–1999.	4-213
Table 4.7-2	Criteria used to determine significance of effects on seabirds.	4-228
Table 4.7-3	Summary of effects of Alternatives 1 through 5 on seabirds.	4-229
Table 4.8-1	Average Bycatch and Bycatch Rates of HAPC Biota, for Pollock, Pacific cod, and Atka mackerel, in the Bering Sea and Aleutian Islands 1997–1999	4-239
Table 4.8-2	Areas closed and partially closed to fishing under alternatives 1 through 5	4-240
Table 4.8-3	Annual TACs of pollock, Pacific cod, and Atka mackerel under alternatives 1 through 5 (based on 2001 ABCs and TACs).	4-241
Table 4.8-4	Criteria for Determining Significance of Effects of the Alternatives on Essential Fish Habitat	4-246
Table 4.8-5	Summary of effects of alternatives on marine benthic habitat.	4 - 2 4 7
Table 4.9-1	Indicators of biomass change and energy removal for each alternative, using projected biomass and catch (mt/1000) for the years 2001 and 2006 for comparison of projected impacts	4-255
Table 4.9-2	Criteria for determining significance of effects of the alternatives on predator-prey relationships, energy flow and balance, and diversity.	4-260
Table 4.9-3	Summary of effects of Alternatives 1 through 5 on ecosystem.	4-262
Table 4.10-1	Summary of Effects on State and Parallel Pacific Cod Fisheries in the Gulf of Alaska.	4-265
Table 4.10-2	Summary of Effects on Harvest Levels within the State Pollock Fishery in Prince William Sound.	4-266
Table 4.11-1	Number of pollock, Pacific cod, and Atka mackerel quota categories created under each alternative	4-271
Table 4.11-2	Number of catcher/processors that participated in the 2000 BSAI and GOA groundfish fisheries, by gear, area, and target fishery and total catch of the target species (Atka mackerel, pollock, and Pacific cod) in the directed fisheries for these species by catcher/processors and catcher vessels delivering to motherships.	4-284
Table 4.11-3	Number of catcher vessels that participated in the BSAI and GOA groundfish fisheries in 1999, by gear type, vessel length, area, and directed fishery, and the percent of catch of the target species by each catcher vessel category	4-286
Table 4.11-4	Estimated number of days fishing by catcher/processors in 2000 and estimated annual VMS transmission costs for catcher/processors by gear type	4-287
Table 4.11-5	Estimated minimum, maximum, and average number of days fished by each catcher vessel in 1999, and the estimated daily VMS transmission costs per vessel	4-288

Table 4.11-6	Explanation of criteria for rating significance of management and enforcement impacts	4-294
Table 4.11-7	Summary of effects of Alternatives 1-5 on management complexity and enforcement	4-294
Table 4.12-A	Summary of effects of Alternatives 1 through 5 on Economic and Social Impacts	4-228
Table 4.12-0	Regional productivity adjustment factor for 1999	4-231
Table 4.12-1	Alternative 1 - All regions groundfish fishery socioeconomic indicators	4-245
Table 4.12-2	Alternative 1 - Alaska Peninsula/Aleutian Island region groundfish fishery socioeconomic indicators	4-246
Table 4.12-3	Alternative 1 - Kodiak region groundfish fishery socioeconomic indicators	4-247
Table 4.12-4	Alternative 1 - Southcentral region groundfish fishery socioeconomic indicators	4-248
Table 4.12-5	Alternative 1 - Southeast region groundfish fishery socioeconomic indicators	4-249
Table 4.12-6	Alternative 1 - Washington inland waters region groundfish fishery socioeconomic indicators	4-250
Table 4.12-7	Alternative 1 - Oregon Coast region groundfish fishery socioeconomic indicators	4-251
Table 4.12-8	Alternative 2 - All regions groundfish fishery socioeconomic indicators	4-252
Table 4.12-9	Alternative 2 - All regions groundfish fishery socioeconomic indicators difference from Alternative 1 (Baseline)	4-253
Table 4.12-10	Alternative 2 - All regions groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-254
Table 4.12-11	Alternative 2 - Alaska Peninsula/Aleutian Islands region groundfish fishery socioeconomic indicators	4-255
Table 4.12-12	Alternative 2 - Alaska Peninsula/Aleutian Islands region groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-256
Table 4.12-13	Alternative 2 - Alaska Peninsula/Aleugian Islands region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-257
Table 4.12-14	Alternative 2 - Kodiak region groundfish fishery socioeconomic indicators	4-258
Table 4.12-15	Alternative 2 - Kodiak region groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-259
Table 4.12-16	Alternative 2 - Kodiak region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-260
Table 4.12-17	Alternative 2 - Southcentral region groundfish fishery socioeconomic indicators	4-261
Table 4.12-18	Alternative 2 - Southcentral region groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-262
Table 4.12-19	Alternative 2 - Southcentral region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-263

Table 4.12-20	Alternative 2 - Southeast region groundfish fishery socioeconomic indicators	4-264
Table 4.12-21	Alternative 2 - Southeast region groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-265
Table 4.12-22	Alternative 2 - Southeast region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-266
Table 4.12-23	Alternative 2 - Washington inland waters region groundfish fishery socioeconomic indicators	4-267
Table 4.12-24	Alternative 2 - Washington Inland waters region groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-268
Table 4.12-25	Alternative 2 - Washington inland waters region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-269
Table 4.12-26	Alternative 2 - Oregon Coast region groundfish fishery socioeconomic indicators	4-270
Table 4.12-27	Alternative 2 - Oregon Coast region groundfish fishery socioeconomic indicators difference from alternative 1 (baseline)	4-271
Table 4.12-28	Alternative 2 - Oregon Coast region groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-272
Table 4.12-29	Alternative 4 - All regions groundfish fishery socioeconomic indicators	4-273
Table 4.12-30	Alternative 4 - All regions groundfish fishery socioeconomic indicators difference from Alternative 1 (baseline)	4-274
Table 4.12-31	Alternative 4 - All regions groundfish fishery socioeconomic indicators percentage difference from Alternative 1 (baseline)	4-275
Table 4.13-1	Steller Sea Lion	4-382
Table 4.13-2	Great Whales (ESA listed)	4-389
Table 4.13-3	Other Cetaceans (not ESA listed)	4-392
Table 4.13-4	Northern Fur Seal	4-401
Table 4.13-5	Harbor Seal	4-413
Table 4.13-6	Other Pinnipeds	4-416
Table 4.13-7	Sea Otter	4-419
Table 4.13-8	Summary of Cumulative Effect Analysis for Eastern Bering Sea Pollock	4-424
Table 4.13-9	Summary of Cumulative Effect Analysis for Gulf of Alaska Pollock	4-425
Table 4.13-10	Summary of cumulative effect analysis for BSAI Pacific cod	4-429
Table 4.13-11	Summary of cumulative effect analysis for GOA Pacific cod	4-430
Table 4.13-12	Summary of Cumulative Effect Analysis for Eastern Bering Sea/Aleutian Islands Atka Mackerel	4-433
Table 4.13-13	Summary of Cumulative Effect Analysis for Atka Mackerel GOA	4-434
Table 4.13-14	Summary of Cumulative Effect Analysis for BSAI Yellowfin Sole, Rock Sole, Greenland Turbot, Flathead Sole, Arrowtooth Flounder, and Alaska Plaice, and GOA Arrowtooth Flounder	4-438
Table 4.13-15	Summary of Cumulative Effect Analysis for BSAI “Other Flatfish,” and GOA Shallow Water Flatfish, Deep Water Flatfish, and Flathead Sole	4-439
Table 4.13-16	Summary of Cumulative Effect Analysis for BSAI Pacific Ocean Perch	4-443
Table 4.13-17	Summary of Cumulative Effect Analysis for BSAI Other Red Rockfish	

and Other Rockfish	4-444
Table 4.13-18 Summary of Cumulative Effects Analysis for GOA Rockfish	4-445
Table 4.13-19 Summary of Cumulative Effect Analysis for GOA Thornyheads	4-448
Table 4.13-20 Summary of Cumulative Effect Analysis for BSAI and GOA Sablefish	4-451
Table 4.13-21 Cumulative Effects Summary - Halibut BSAI and GOA	4-456
Table 4.13-22 Red King Crab and Tanner Crab BSAI and GOA Other Tanner Crab BS and GOA Other King Crab AI and GOA	4-459
Table 4.13-23 Other King Crab BS	4-461
Table 4.13-24 Other Tanner Crab AI	4-464
Table 4.13-25 Herring BS Cumulative Effects	4-466
Table 4.13-26 Herring AI - Cumulative Effects	4-467
Table 4.13-27 Herring GOA - Cumulative Effects	4-468
Table 4.13-28 Salmon (including Chinook) GOA	4-471
Table 4.13-29 Salmon (including Chinook) BS Cumulative Effects	4-472
Table 4.13-30 Chinook Salmon AI Cumulative Effects	4-473
Table 4.13-31 Other Salmon AI - Cumulative Effects	4-474
Table 4.13-32 Northern Fulmars	4-481
Table 4.13-33 Short-Tailed Albatross	4-483
Table 4.13-34 Other Albatross and Shearwaters	4-484
Table 4.13-35 Piscivorous Seabirds	4-485
Table 4.13-36 Eiders (Spectacled and Steller's)	4-486
Table 4.13-37 Marine Benthic Habitat - Cumulative Effects	4-492
Table 4.13-38 Cumulative Effects Summary – Predator-Prey Relationships	4-503
Table 4.13-39 Cumulative Effects Summary – Energy Flow and Balance	4-507
Table 4.13-40 Cumulative Effects Summary – Biological Diversity	4-511
Table 4.13-41 Fishing Industry Sector and Consumer Values – Alternative 1 No Action - Past Effects	4-528
Table 4.13-42 Fishing Industry Sector and Consumer Values – Cumulative Effects for Alternative 1	4-529
Table 4.13-43 Fishing Industry Sector and Consumer Values – Cumulative Effects for Alternative 2	4-530
Table 4.13-44 Fishing Industry Sector and Consumer Values – Cumulative Effects for Alternative 3	4-531
Table 4.13-45 Fishing Industry Sector and Consumer Values – Cumulative Effects for Alternative 4	4-532
Table 4.13-46 Fishing Industry Sector and Consumer Values – Cumulative Effects for Alternative 5	4-533
Table 4.13-47 Regions and Communities – Cumulative Effects for Alternative 1	4-546
Table 4.13-48 Regions and Communities – Cumulative Effects for Alternatives 2 and 3	4-547
Table 4.13-49 Regions and Communities – Cumulative Effects for Alternative 4	4-548
Table 4.13-50 Regions and Communities – Cumulative Effects for Alternative 5	4-549

LIST OF FIGURES

Figure 1.1-1	Map of the groundfish fisheries management areas in the North Pacific Ocean and range of SSL	1-1
Figure 2.2-1	Timeline of management actions taken to reduce potential impacts of fishing on Steller sea lions.	2-3
Figure 2.3-1	Alternative 1 - No Action	Map insert
Figure 2.3-2	Alternative 2- Low and Slow Approach	Map insert
Figure 2.3-3	Alternative 3 - Restricted and Closed Area Approach	Map insert
Figure 2.3-4	Alternative 4- Page 1 of 4 Area and Fishery Specific Approach Pacific Cod trawl	Map insert
Figure 2.3-5	Alternative 4- Page 2 of 4 Area and Fishery Specific Approach Pacific Cod-Fixed gear	Map insert
Figure 2.3-6	Alternative 4- Page 3 of 4 Area and Fishery Specific Approach Atka mackerel and pollock	Map insert
Figure 2.3-7	Alternative 4- Page 4 of 4 Area and Fishery Specific Approach GOA Pacific cod options	Map insert
Figure 2.3-8	Alternative 5- Critical Habitat and Catch Limit Approach	Map insert
Figure 2.5-1	Groundfish harvests in the Bering Sea subarea by species, 1952-1999	2-45
Figure 2.5-2	Groundfish harvests in the Aleutian Islands subarea by species, 1962-1999	2-45
Figure 2.5-3	Groundfish harvests in the Gulf of Alaska by species, 1958-1999	2-46
Figure 2.5-4	Foreign, joint-venture, and domestic groundfish fishing and processing, 1977-1998	2-46
Figure 3.1-1	Steller Sea Lion Western Stock Population Trends, 1976-2000.	3-26
Figure 3.1-2	Regional Steller Sea Lion Population Trends, 1976-2000.	3-27
Figure 3.1-3	Counts of Steller Sea Lion Pups in Alaska (Sease and Loughlin, 1999).	3-28
Figure 3.1-4	Population Trends of Steller Sea Lion Eastern Stock in Southeast Alaska, 1975-2000.	3-29
Figure 3.1-5	Counts of Steller Sea Lions in the Eastern Stock, 1982-1998 (adapted from Angliss <i>et al.</i> , 2001).	3-30
Figure 3.1-6	Distribution of Steller Sea Lions in the Bering Sea and Western/Central Gulf of Alaska From Platform of Opportunity (POP) Database (NMFS Data).	3-31
Figure 3.1-7	Proportion of Dives by Depth Range for Young-of-the-year (WYOY) and Adult Female Steller Sea Lions in Summer (SAF) and Winter (WAF) Tracked During 1990-1993 (Merrick and Loughlin, 1997)	3-32
Figure 3.1-8	Frequency of Occurrence of Prey Items Occurring in Steller Sea Lion Scats, in All Regions and Seasons, 1990-1998 (Sinclair and Zeppelin, submitted).	3-33
Figure 3.1-9	Steller Sea Lion Diet Divisions in Relation to Population Trends (1989-1994) (Sinclair and Zeppelin, submitted).	3-34
Figure 3.1-10	Locations of Observed Steller Sea Lions Incidentally Caught in Domestic Groundfish Trawl (circles) and Longline (triangles) Fisheries, 1989-1999.	3-35
Figure 3.1-11	Platforms of Opportunity Program Data - Bowhead Whale, Right Whale, and Blue Whale	3-45

Figure 3.1-12	Platforms of Opportunity Program Data -Fin Whale	3-46
Figure 3.1-13	Commercial Groundfish Fishery Incidental Take	3-47
Figure 3.1-14	Platforms of Opportunity Program Data - Sei Whale	3-48
Figure 3.1-15	Platforms of Opportunity Program Data - Humpback Whale	3-49
Figure 3.1-16	Platforms of Opportunity Program Data - Sperm Whale	3-50
Figure 3.1-17	Seasonal range of gray whale population fishery management areas	3-62
Figure 3.1-18	Seasonal range of minke whale population in fishery management areas	3-63
Figure 3.1-19	Location of the incidental take of non-listed marine mammal species by groundfish fisheries	3-64
Figure 3.1-20	Seasonal range of Baird's beaked whale, Cuvier's beaked whale, and beluga whale populations in fishery management areas	3-65
Figure 3.1-21	Seasonal range of the killer whale population in fishery management areas	3-66
Figure 3.1-22	Seasonal range of pacific white-sided dolphin population in fishery management areas	3-67
Figure 3.1-23	Seasonal range of harbor porpoise population in fishery management areas	3-68
Figure 3.1-24	Seasonal range of dall's porpoise population in fishery management areas	3-69
Figure 3.1-25	Location of incidental take of Dall's porpoise by the groundfish fisheries	3-70
Figure 3.1-26	Meta-home ranges for lactating northern fur seals from St. Paul and St. George Islands.	3-75
Figure 3.1-27	Points on the figures above represent the numbers of northern fur seal pups born on St. Paul Island (top) and St. George Island (bottom), Alaska. The line represents the fitted negative exponential model.	3-76
Figure 3.1-28	Harbor Seal Locations Egegik Locations September 2000	3-79
Figure 3.1-29	Combined harbor seal pup and non-pup average distance to shore locations	3-80
Figure 3.1-30	Harbor seal non-pup average distance to shore locations, Kodiak	3-81
Figure 3.1-31	Combined harbor seal pup and non-pup average distance to shore locations Kodiak and PWS	3-82
Figure 3.1-32	Harbor seal pup average distance to shore locations, Tugidak Island	3-83
Figure 3.1-33	1998-2000 Catch (lbs) from Catcher vessels	3-85
Figure 3.2-1	Distribution of fishery operations during 1998–1999. A-Season represents pollock caught during January 20–March 31, B-Season represents pollock caught during the second half of the calendar year.	3-103
Figure 3.2-2	Distribution of observed trawl locations in the Gulf of Alaska where pollock was the target species, 1996.	3-104
Figure 3.2-3	Observed Atka mackerel fishery locations in the Aleutian Islands region in 1998. Trawl exclusion zones, Steller sea lion critical habitat zones around rookeries and haulouts, the 200-m isobath, management Areas 541–543, and names of locations fished are shown.	3-116
Figure 3.2-4	Observed Atka mackerel fishery locations in the Aleutian Islands region in 1999. Trawl exclusion zones, Steller sea lion critical habitat zones around rookeries and haulouts, the 200-m isobath, management Areas 541-543, and names of locations fished are shown.	3-117
Figure 3.5-1	Management areas involving prohibited species and walrus in the Bering Sea.	3-120
Figure 3.5-2	Management areas involving prohibited species in the Bering Sea and Gulf of Alaska	3-121
Figure 3.5-3	Critical habitat (shaded circle and square areas) with chinook salmon by catch	

Figure 3.5-4	in pelagic trawl fisheries, 1997-1999, for comparison	3-126
Figure 3.5-5	Distribution of BSAI chum salmon bycatch in pelagic trawl, 1997–1999	3-127
Figure 3.5-6	Observed locations of recent halibut bycatch on longlines, with cod longliner target fishery	3-130
Figure 3.5-7	Observed locations of recent halibut bycatch in bottom trawls, with target fishery distributions	3-131
Figure 3.7-1	Spatial distribution of herring bycatch within the BSAI pelagic pollock fishery, 1997-1999.	3-133
Figure 3.9-1	Final Critical Habitat for Spectacled and Steller's Eider	3-153
Figure 3.9-2	Biomass trends in Bering Sea trophic guilds, 1979–1998.	3-161
Figure 3.8-1	Trend in index of species composition based on ordination of species abundance data from five triennial surveys on Gulf of Alaska shelf and slope with approximate 95 percent confidence interval	3-164
Figure 3.10-1	Species diversity of benthic invertebrate megafauna in heavily fished and unfished areas by station pairs in the eastern Bering Sea.	3-164
Figure 3.10-2	Year-round non-pelagic trawl closure areas (shaded areas) in state waters of the central and western Gulf of Alaska and southeastern Bering Sea	3-172
	Year-round and seasonal trawl restrictions in Prince William Sound	3-176
Figure 4.1-1	Total catch of pollock during the summer and fall fishery in the eastern Bering Sea	4-55
Figure 4.1-2	Hours trawled during the summer and fall Pollock fishery in the eastern Bering Sea	4-56
Figure 4.1-3	Location of trawls (circles) during the summer-fall eastern Bering Sea pollock Fishery in 1997-2000.	4-57
Figure 4.1-4	Distribution of Bering Sea groundfish trawl fishery incidental catch of Steller sea lions by fishery area and year, 1990-1999. Data: NMFS	4-79
Figure 4.1-5	Projected average daily removal rates of Eastern Bering Sea pollock and Pacific cod for each alternative.	4-80
Figure 4.1-6	Deviations of relative mean daily removal rates for Eastern Bering Sea pollock and Pacific cod fisheries based on projected seasonal allocation of total allowable catch for each alternative.	4-81
Figure 4.1-7	Projected average daily removal rates of Aleutian Island pollock, Pacific cod and Atka mackerel for each alternative.	4-82
Figure 4.1-8	Deviations of relative mean daily removal rates for Aleutian Islands pollock, Pacific cod and Atka mackerel fisheries based on projected seasonal allocations of total allowable catch for each Alternative.	4-83
Figure 4.1-9	Projected average daily removal rates of Gulf of Alaska pollock and Pacific cod for each Alternative.	4-84
Figure 4.1-10	Deviations of relative mean daily removal rates for Gulf of Alaska pollock and Pacific cod fisheries based on projected seasonal allocation of total allowable catch for each Alternative.	4-85
Figure 4.1-11	Percent frequency of occurrence of top three prey items found in Steller sea lion scats collected December through April, 1990-1998.	4-86
Figure 4.1-12	Percent frequency of occurrence of top three prey items found in Steller sea lion scats collected in June through August, 1990-1999.	4-87

Figure 4.1-13	Three-dimensional projections of a 14.3 day long foraging trip of an 11 month old male Steller sea lion during the month of May, 2000 at Sequam Island.	4-88
Figure 4.1-14	A 14.3 day foraging trip of an 11 month old male Steller sea lion during May 2000 at Kodiak Island.	4-89
Figure 4.1-15	Regional distribution of pollock catch from catch vessels during 1998-2000 (Source: NPFMC and NMFS).	4-90
Figure 4.1-16	Regional distribution of cod catch from trawler vessels, 1998-2000 (Source: NPFMC and NMFS)	4-91
Figure 4.1-17	Regional distribution of observed Atka mackerel trawls, 1998-2000 (Source: NPFMC and NMFS).	4-92
Figure 4.2-1	General description of the SEIS simulation model that calculates the optimal distribution of the catch across different fisheries subject to a set of linear constraints and bycatch datasets..	4-94
Figure 4.2-2	Relationship of fishing mortality rates under different control rules applied to pollock, Pacific cod, and Atka mackerel. FMP Amendments 56/56 harvest guidelines are used for Alternatives 1, 2, and 5..	4-96
Figure 4.7.1	Piscivorous seabird colonies in the BSAI in relationship to Alternative 4- Area and Fishery Specific Approach- Pacific Cod Fisheries	4-233
Figure 4.7.2	Piscivorous seabird colonies in the GOA in relationship to Alternative 4- Area and Fishery Specific Approach- Pacific Cod Fisheries	4-234
Figure 4.7.3	Short-tailed Albatross (STAL) sightings (by breeding season and take locations) in the BSAI in relationship to Alternative 2 - Low and Slow Approach	4-235
Figure 4.7.4	Short-tailed Albatross (STAL) sightings (by breeding season and take locations) in the GOA in relationship to Alternative 2 - Low and Slow Approach	4-236
Figure 4.8-1	Gorgonian corals and Steller sea lion Critical Habitat	4-248
Figure 4.8-2	Steller sea lion critical habitat and sea sponge distribution	4-249
Figure 4.8-3	Steller sea lion critical habitat and Atka mackerel essential fish habitat	4-250
Figure 4.11-1	Weekly pollock harvests from the BSAI pollock fishery, 1997 to 2000	4-293

INDEX OF ACRONYMS AND ABBREVIATIONS

ABC	acceptable biological catch
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	NMFS Alaska Fisheries Science Center
AP	Council's Advisory Panel
APA	Administrative Procedure Act
BS	Bering Sea
BSAI	Bering Sea and Aleutian Islands
CDQ	community development quota
CFEC	Commercial Fisheries Entry Commission
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH	critical habitat (as defined under ESA)
CPUE	catch per unit effort
CV	coefficient of variation
CVOA	catcher vessel operational area
CZMA	Coastal Zone Management Act
DAH	domestic annual harvest
DAP	domestic annual processing
DCPL	daily cumulative production logbook
DFL	daily fishing logbook
DSR	demersal shelf rockfish
EA	environmental assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	environmental impact statement
ENSO	El NiÑo/Southern Oscillation
E.O.	Executive Order
ESA	Endangered Species Act
ESU	evolutionarily significant units
FMPs	fishery management plan(s)
FONSI	finding of no significant impact
FR	Federal Register
GHL	guideline harvest level
GIS	geographic information system
GOA	Gulf of Alaska
GPS	Global Positioning System
HAPC	habitat area of particular concern
ICA	incidental catch allowance
IFQ	individual fishing quota
IFR	interim final rule
IPHC	International Pacific Halibut Commission
IRIU	improved retention and improved utilization
ITAC	interim total allowable catch
ITQ	individual transferable quota

LLP	License Limitation Program
LOA	length overall
<i>M</i>	natural mortality rate
MSFCMA	Magnuson-Stevens Fishery Conservation Management Act
Magnuson-Stevens Act	same as above
MMPA	Marine Mammal Protection Act
MPA(s)	marine protected area(s)
MRB	maximum retainable bycatch
MSST	minimum stock size threshold
MSY	maximum sustainable yield
mt	metric ton
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NMML	NMFS AFSC National Marine Mammal Laboratory
NOA	notice of availability
NOAA	National Oceanic and Atmospheric Administration
NPFMC (Council)	North Pacific Fishery Management Council
NRC	National Research Council
OFL	overfishing level
OMB	Office of Management and Budget
OY	optimum yield
PBR	potential biological removal
Pub. L.	Public Law
PR	proposed rule
PSC	prohibited species catch
PSQ	prohibited species quota
RAM	Restricted Access Management
REFM	NMFS AFSC Resource Ecology and Fisheries Management Division
RFA	Regulatory Flexibility Act
RIR	regulatory impact review
RKCSA	Red King Crab Savings Area
RPA	reasonable and prudent alternatives
SAFE	Stock Assessment and Fishery Evaluation
SBREFA	Small Business Regulatory Enforcement Fairness Act
SCA	Steller sea lion conservation area
SEIS	supplemental environmental impact statement
SPR	spawning per recruit
SSC	Council's Scientific and Statistical Committee
TAC	total allowable catch
U.S.C.	United States Code
USCG	United States Coast Guard
USDOC	United States Department of Commerce
USFWS	United States Fish and Wildlife Service
USDOI	United States Department of the Interior
VIP	Vessel Incentive Program

VMP	Vessel Moratorium Program
VMS	Vessel Monitoring System
WHSAs	Winter Herring savings area
WPR	weekly production report